The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JOSEPH F. BRINGLEY and GARY N. BARBER

Appeal 2007-2677
Application 10/622,229

Decided: 27 September 2007

Before FRED E. McKELVEY, *Senior Administrative Patent Judge*, and ADRIENE LEPIANE HANLON and MICHAEL P. TIERNEY, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from a final rejection of claims 1, 10, 13-21, and 25, the only claims remaining in the application on appeal.

We have jurisdiction under 35 U.S.C. § 6(b).

The application on appeal was filed on July 18, 2003.

The real party in interest is Eastman Kodak Company.

The Examiner finally rejected claims 1, 10, and 13-21 under 35 U.S.C. §103(a) as being unpatentable over Darsillo. Final Office Action mailed November 7, 2005 at 2.

The Examiner finally rejected claims 1, 10, 13-21, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Darsillo, Bi, and Alexander. Final Office Action mailed November 7, 2005 at 2.

The following prior art was relied on by the Examiner:

Alexander	3,007,878	Nov. 7, 1961
Darsillo	6,365,264	Apr. 2, 2002
Bi	2004/0197498	Oct. 7, 2004

Darsillo and Alexander are prior art under 35 U.S.C. § 102(b).

Bi is prior art under 35 U.S.C. § 102(e).

In this appeal, the Appellants have not attempted to antedate Bi. Therefore, for the purpose of this appeal, Bi is prior art.

B. ISSUES

Whether the Appellants have shown that the Examiner erred in rejecting claims 1, 10, and 13-21 under 35 U.S.C. § 103(a) as being unpatentable over Darsillo.

Whether the Appellants have shown that the Examiner erred in rejecting claims 1, 10, 13-21, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Darsillo, Bi, and Alexander.

C. FINDINGS OF FACT

The following findings of fact are believed to be supported by a preponderance of the evidence. Additional findings of fact as necessary appear in the Analysis portion of the opinion.

1. Background of the invention

In a typical inkjet recording or printing system, ink droplets are ejected from a nozzle at high speed toward a recording element or medium to produce an image on the medium. Specification 1:9-11.

The ink droplets, or recording liquid, generally comprise a recording agent, such as a dye or pigment, and a large amount of solvent. Specification 1:11-13.

An inkjet recording element typically comprises a support having an ink-receiving or image-receiving layer on at least one surface thereof. Specification 1:16-17.

An important characteristic of inkjet recording elements is the need to dry quickly after printing. To this end, porous recording elements have been developed which provide nearly instantaneous drying. For example, a porous recording element can be manufactured by applying a coating of a particulate-containing suspension on a support. Specification 1:20-25.

Another important characteristic of inkjet recording elements is that they should exhibit high gloss so that images printed on them appear vivid and bright. To this end, the precise size and shape of the particulates are important since it is desirable to achieve both high porosity and high gloss in the coated layer. Large particles (greater than about 500 nm) result in coatings with high porosity but low gloss, whereas small particles (less than about 100 nm) result in low porosity but high gloss. Specification 1:26-2:2.

2. Appellants' invention

According to the Appellants' Specification, there remains a need for inkjet recording elements that, when printed with dye-based inks, provide images which dry very quickly, have high gloss, and have excellent resistance to atmospheric image fade. Specification 2:28-30.

The Appellants' invention is directed to an inkjet recording element containing small and large core-shell particles which are said to dry very quickly and provide images having high gloss and excellent resistance to atmospheric image fade. Specification 4:30-5:2.

The small particles may be selected from, for example, silica, alumina, titania, and zirconia. Specification 6:29-7:2.

The large particles may be selected from, for example, silica, alumina, calcium carbonate, and zinc oxide. Specification 7:23-27.

At least one of the small and large particles is "shelled." Specification 5:3-4.

The term "shelled" is used to indicate that the surfaces of the particles have been chemically modified with a composition of matter that is different from that of the "core," or interior of the particles. Such surface-modified particles are often referred to as "core-shell particles." Specification 5:4-8.

At least one of the large and small particles present in the image-receiving layer must be shelled with a material providing image fade resistance. Specification 5:8-9.

Preferred shell materials are metal oxide hydroxide complexes. Specification 5:15-29.

In another preferred embodiment the shell material comprises an organosilane or hydrolyzed organosilane. Specification 6:3-15.

In yet another preferred embodiment the shell material comprises an aluminosilicate polymer. Specification 6:21-25.

The small particles of the image-receiving element should have a median particle size between about 20 and 180 nm, and it is further preferred

that the small particles have a median particle size between about 80 and 140 nm. Specification 7:2-5.

The preferred particle size ranges of the small particles are said to provide image-receiving layers with particularly high gloss. Specification 7:5-6.

The large particles of the image-receiving element should have a median particles size between about 200 and 500 nm, and it is further preferred that the large particles have a median particle size between about 200 and 300 nm. Specification 7:27-30.

The preferred particle size ranges of the large particles are said to provide image-receiving layers with greatest porosity. Specification 7:30-31.

In a preferred embodiment, the weight ratio of large to small particles is from 80:20 to 20:80, and more preferably from 65:35 to 35:65. These ratios are preferred because they are said to provide image receiving-layers with both high porosity and high gloss. Specification 8:21-26.

It is preferred that the image-receiving element have a porosity of greater than about 40% as calculated by the method of Inventive Example 5. Specification 9:7-10.

It is also preferred that the image-receiving element have a 60° gloss of greater than 15, and more preferably greater than 25. Specification 9:13-15.

These gloss values are said to improve the overall image quality of the printed image. Specification 9:15-16.

3. Appellants' claimed invention

Claim 1 is the only independent claim on appeal.

Claim 1 reads as follows:

> An image-receiving element comprising a mixture of large and small particles wherein said large and said small particles are shelled with a material providing image fade resistance selected from the group consisting of hydrolyzable organosilanes, aluminasilicate polymers and metal oxyhydroxy complexes, and wherein said large particles and said small particles have a ratio of from 65:35 to 35:65, wherein said small particles have a median particle size of between 80 and 140 nm, wherein said large particles have a median particle size of between 200 and 300 nm, wherein said image-receiving element has a porosity of greater than about 40%, and wherein said image-receiving element has a 60° gloss of greater than 25.

4. Darsillo

Darsillo discloses a recording medium comprising a substrate having a glossy coating thereon, wherein the glossy coating comprises first and second groups of particles, wherein:

(a) the first group comprises metal oxide particles, wherein the metal oxide particles are aggregates of smaller, primary particles,

(b) the mean diameter of the primary particles is less than about 100 nm,

(c) the mean diameter of the aggregates is from about 100 nm to about 500 nm,

(d) the mean diameter of the particles in the second group is less than about 50% of the mean diameter of the aggregates in the first group, and

(e) the ratio of particles in the first group to particles in the second group is from about 0.1:1 to about 10:1 by weight. Darsillo 1:64-2:13.

The second group of particles has a mean diameter of less than about 300 nm. Darsillo 7:26-28.

The first group of particles preferably comprises particles of one or more metal oxides such as silica, alumina, titania, and zirconia. Darsillo 4:61-66.

The second group of particles can comprise, for example, silica, alumina, calcium carbonate, and zinc oxide. Darsillo 8:60-9:9.

A metal oxide particle that is an aggregate of smaller primary particles, such as pyrogenic metal oxide, has a porous substructure, and coatings that comprise such particles have a relatively rapid rate of liquid absorption and a relatively high liquid absorption capacity. Darsillo 5:43-47.

Furthermore, the coating retains a high porosity due to the intra-particle voids of the aggregate particles. Darsillo 7:6-9.

The first group of metal oxide particles can be cationic. Darsillo 4:66-5:1.

The second group of particles can also be cationic. Darsillo 8:51-59.

Metal oxides can be made cationic via surface modification. For example, silica can be made cationic by treating the silica with one or more inorganic cationic modifiers such as an inorganic salt (e.g., aluminum chlorohydrate). Likewise, silica can be made cationic by treating the silica with one or more organic cationic modifiers such as a silane or a polymer (e.g., polyamine polymer). Darsillo 5:2-10.

It is preferred that the recording medium has a 75° specular gloss of at least about 15%. More preferably, the recording medium has a 75° specular gloss of at least about 25%, even more preferably at least about 35%, and still more preferably at least about 45%, yet more preferably at least about 55%, and most preferably at least about 65%. Darsillo 3:25-31.

Desirably, the recording medium is calendered to provide a glossier coating. Darsillo 3:23-25.

5. Bi

Bi discloses a recording sheet comprising a two-layer coating. The bottom, or first, layer comprises amorphous silica and the top, or second, layer comprises spherical silica. Bi at [0008].

Bi discloses a method of preparing an ink jet recording sheet comprising:

(a) providing a substrate;

(b) forming the first layer on the substrate by (1) providing amorphous SiO_2, (2) adding the amorphous SiO_2 to a cationic-inducing compound to form a dispersion, (3) mixing the dispersion with a binder to form a mixture, and (4) coating the mixture on the substrate; and

(c) forming the second layer on the first layer by (1) providing spherical silica, (2) mixing the spherical silica with either little or no binder, and (3) coating the spherical silica on the first layer. Bi at [0009-0012].

Both silica layers are rendered cationic with a cationic-inducing compound. Bi at [0008].

The cationic-inducing compound is selected from the group consisting of hydroxyl-containing polyvalent metal salts and cationic resins. Bi at [0028].

An example of a hydroxyl-containing polyvalent metal salt is aluminum chlorohydrate, a cationic modifying agent. Such polyvalent metal salts have been described in Alexander. Bi at [0028].

Examples of cationic agents and resins include polyalkylenepolyamines and silica coupling agents with primary, secondary, or tertiary amino groups or quaternary ammonium groups. Bi at [0029].

The recording sheet is said to provide excellent gloss, fast dry time, excellent image quality, and superior water resistance and handle ability. Bi at [0008].

6. Alexander

The invention disclosed in Alexander is directed to aquasols of a dense silica core coated with a polyvalent metal-oxygen compound of the class consisting of metal oxides, metal hydroxides, and hydrated metal oxides. Alexander 1:13-17.

D. PRINCIPLES OF LAW

A claimed invention is not patentable if the subject matter of the claimed invention would have been obvious to a person having ordinary skill in the art. 35 U.S.C. § 103(a); *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d 1385 (2007); *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

Facts relevant to a determination of obviousness include (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objective evidence of obviousness or non-obviousness. *KSR*, 127 S. Ct. at 1734, 82 USPQ2d at 1389, *Graham*, 383 U.S. at 17-18.

One of ordinary skill in the art is presumed to have skills apart from what the prior art references expressly disclose. *See In re Sovish*, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985). A person of ordinary skill is

also a person of ordinary creativity, not an automaton. *KSR*, 127 S. Ct. at 1742, 82 USPQ2d at 1397.

The question under 35 U.S.C. § 103 is not merely what the references teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made. All disclosures of the prior art, including unpreferred embodiments, must be considered. *In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976).

A rejection premised upon a proper combination of references cannot be overcome by attacking the references individually. *In re Keller*, 642 F.2d 413, 426, 208 USPQ 871, 882 (CCPA 1981).

It is well-settled that where the difference between the claimed invention and the prior art is an overlapping range, the Appellants must show that the particular range is critical by evidence of unexpected results. *In re Wertheim*, 541 F.2d 257, 267, 191 USPQ 90, 100 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

A showing of "unexpected results" must establish that the difference actually obtained would not have been expected by one skilled in the art. *In re Freeman*, 474 F.2d 1318, 1324, 177 USPQ 139, 143 (CCPA 1973). Likewise, the difference must be shown to be significant. *In re D'Ancicco*, 439 F.2d 1244, 1248, 169 USPQ 303, 306 (CCPA 1971).

Nothing in the rules or in jurisprudence requires the fact finder to credit unsupported or conclusory assertions. *Rohm and Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092, 44 USPQ2d 1459, 1462 (Fed. Cir. 1997).

E. ANALYSIS

1. Rejection based on Darsillo

The Examiner found that Darsillo discloses a recording medium that has a glossy coating and comprises first and second groups of particles. Answer 3.[1] We find that the median diameter of the first group of particles (less than about 100 nm) overlaps the claimed median size of the Appellants' small particles (between 80 and 140 nm), and the median diameter of the second group of particles (less than about 300 nm) overlaps the claimed median size of the Appellants' large particles (between 200 and 300 nm). The Examiner also found that the ratio of first to second groups of particles disclosed in Darsillo overlaps the claimed ratio of large to small particles. Answer 3-4.

The Examiner found that Darsillo does not appear to disclose the actual porosity of the medium. In any event, the Examiner found that the medium disclosed in Darsillo would be inherently porous. The Examiner concluded that based on the awareness in the prior art of the importance of porosity, it would have been obvious to one of ordinary skill in the art to optimize the porosity of the layer in order to obtain the desired ink absorption capacity. Answer 4.

The Examiner found that Darsillo is concerned with gloss but does not measure gloss in the terms set forth in the claims. The Examiner concluded that it would have been obvious to one of ordinary skill in the art to control the gloss of the recording medium based on the desired visual results sought to be achieved. Answer 4.

The Examiner found that the particles in Darsillo may be made cationic by a surface treatment with an inorganic salt (e.g., aluminum chlorohydrate), organic silanes, or a polymer (e.g., a polyamine). The

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[1] Supplemental Examiner's Answer mailed October 10, 2006.

Examiner found that a surface treatment with aluminum chlorohydrate "should inherently create an alumino silicate shell on the particles." Answer 3-4.

With respect to fade resistance, the Examiner found that Darsillo prefers cationic particles. The Examiner found that it is well known in the art that cationic materials will fix anionic dyes commonly used in ink jet recording, making them less likely to migrate through the medium and less subject to bleeding. Answer 5.

The Appellants do not distinguish the claimed shell materials from the materials used in the cationic treatment disclosed in Darsillo. Rather, the Appellants argue that Darsillo does not indicate a preference for cationically shelled particles. Brief 6.[2] To the contrary, Darsillo states, "It is sometimes preferred that cationic particles be included in the glossy coating." Darsillo 5:1-2.

The Appellants also argue that the claimed shell materials have been shown to provide "image fade resistance" and argue that "image fade resistance" is different from the "fade resistance" referred to by the Examiner. Brief 6. Again, the Appellants have not distinguished the claimed shell materials from the materials used in the cationic treatment disclosed in Darsillo. Therefore, to the extent that the claimed shell materials provide "image fade resistance," one of ordinary skill in the art would have expected the materials disclosed in Darsillo to also provide "image fade resistance." *Cf. In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990) (discovery of a new property of a previously

[2] Amended Appeal Brief filed November 13, 2006.

known composition, even when that property is not obvious from the prior art, cannot impart patentability to claims to the known composition).

As for gloss, referring to Example 7 and Table 3 of Darsillo, the Appellants argue that glossy coatings are only obtained in Darsillo after calendering. Brief 7.

The teachings of Darsillo are not limited to the specific examples disclosed. Darsillo expressly discloses that the recording medium has a 75° specular gloss of at least about 15%, and more preferably, a 75° specular gloss of at least about 65%. Darsillo 3:25-31. To the extent that Darsillo discloses that gloss may be increased by calendering the recording medium, we conclude that the claims do not exclude a calendered recording medium.

As for porosity, the Appellants argue that the claimed porosity is not shown in Darsillo. The Appellants argue that Darsillo "discloses porosity of the particles and not the layer of the image-receiving member." Brief 10. The Appellants' argument is not persuasive. Namely, the Appellants have failed to demonstrate that the porous particles of Darsillo would not be expected to form a porous layer.

Based on the foregoing, it is reasonable to conclude that Darsillo renders the claimed invention prima facie obvious. The Appellants rely on secondary considerations, namely "unexpected results," to rebut the prima facie case of obviousness. Specifically, the Appellants argue that the data in Table 1 of the Appellants' Specification shows that the claimed invention exhibits high porosity, high gloss, and low fade compared to several comparative examples (Examples C-1 to C-7). The Appellants do not compare the claimed invention with any actual examples in Darsillo.

Nevertheless, the Appellants argue that Examples C-1 to C-7 are comparable to the invention of Darsillo. Brief 6-7.

The Appellants bear the burden of showing that the claimed invention exhibits unexpected results. The burden is by clear and convincing evidence. *McClain v. Ortmayer*, 141 U.S. 419, 429 (1891) (conclusive evidence needed to show invention performs some new and important function not performed by the prior art); *In re Heyna*, 360 F.2d 222, 228, 149 USPQ 692, 697 (CCPA 1966) (applicant required to submit clear and convincing evidence to support an allegation of unexpected property). *See also In re Passal*, 426 F.2d 409, 412, 165 USPQ 702, 704 (CCPA 1970) and *In re Lohr*, 317 F.2d 388, 392, 137 USPQ 548, 550 (CCPA 1963) (conclusive proof of unexpected results not submitted by applicant).

Table 1 illustrates the porosity, gloss, and fade in several comparative examples (C-1 to C-9) and several "inventive" examples (I-1 to I-5). Inventive Examples I-3 and I-4 are the only examples that appear to fall within the scope of claim 1. Comparative examples C-5 and C-6 appear to correspond to inventive examples I-3 and I-4, respectively, with the exception that the elements of inventive examples I-3 and I-4 have a shell whereas the elements of comparative examples C-5 and C-6 do not have a shell. See Table 1, Specification 18.

We recognize that there are differences in porosity, gloss, and fade between the elements of inventive examples I-3 and I-4 and the elements of comparative examples C-5 and C-6. However, the Appellants have failed to present any evidence, let alone clear and convincing evidence, establishing that one of ordinary skill in the art would have understood these differences to be significant and unexpected, especially in view of the disclosure in

Darsillo indicating that treating silica with cationic modifiers such as an inorganic salt (e.g., aluminum chlorohydrate), a silane, or a polymer (e.g., polyamine polymer) is "sometimes preferred."[3] Darsillo 5:1-10.

For the reasons set forth above, Appellants have not shown that the Examiner erred in concluding that the invention of claim 1 would have been obvious in view of the teachings in Darsillo. Claims 10 and 13-21 stand with claim 1.

2. Rejection based on Darsillo, Bi, and Alexander

The Examiner finds that Bi discloses treating silica particles with a hydroxyl-containing polyvalent metal salt or a cationic resin to make them cationic for inclusion in an ink jet recording sheet. The Examiner finds that Bi discloses that an example of a hydroxyl-containing polyvalent metal salt is disclosed in Alexander. The Examiner finds that Figure 1 in Alexander shows a silica surface that has been complexed with a metal oxyhydroxy material within the scope of the Appellants' claimed invention. The Examiner concludes that the combined teachings of Darsillo, Bi, and Alexander render the claimed invention obvious. Answer 5-6.

Referring to the individual teachings of Darsillo, Bi, and Alexander, the Appellants argue that these references, either alone or in combination, do not teach or suggest the claimed invention. Brief 8-9.

A rejection based on a combination of references cannot be overcome by attacking the references individually. The Appellants have failed to explain why the combined teachings of Darsillo, Bi, and Alexander do not render the claimed invention obvious. Furthermore, we find the Appellants'

[3] "Appendix II – Evidence" attached to the Appellant's Brief contains two articles on gloss. No other evidence is contained in the appendix.

arguments relating to the individual teachings of Darsillo, discussed above, to be equally unpersuasive with respect to the rejection based on the combined teachings of Darsillo, Bi, and Alexander.

F. CONCLUSIONS OF LAW

The Appellants have not shown that the Examiner erred in rejecting claims 1, 10, and 13-21 under 35 U.S.C. § 103(a) as being unpatentable over Darsillo.

The Appellants have not shown that the Examiner erred in rejecting claims 1, 10, 13-21, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Darsillo, Bi, and Alexander.

G. DECISION

The rejection of claims 1, 10, and 13-21 under 35 U.S.C. § 103(a) as being unpatentable over Darsillo is affirmed.

The rejection of claims 1, 10, 13-21, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Darsillo, Bi, and Alexander is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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